

REMARKS

By this amendment, applicants have amended claim 4 to be in independent form by including therein the limitations recited in independent claim 1 (but not the limitations of claims 2 and 3) and have rewritten claims 9 and 16 in independent form by including therein all of the limitations of the claims from which they previously depended. Claim 17 has been amended to depend from now independent claim 16 and claim 18 has been amended to depend from now independent claim 9. Claims 1, 4 and 9 have been amended to clarify that the spray device is provided downstream of the reversing roller. See, e.g., the figure and the description thereof in applicants specification.

Claims 1, 4 and 9 have been amended to clarify that the spray device is provided downstream of the reversing roller. The Examiner has already considered this limitation in connection with independent claim 12. The remaining amendments merely rewrite claims in independent form and change dependency of claims. Accordingly, applicants submit the foregoing amendments do not raise new issues requiring further consideration and/or search. Therefore, entry of this amendment under 37 CFR 1.116 is requested.

Claims 1, 6 - 8, 11 - 13, 15 and 17 - 18 stand rejected under 35 USC 103 as allegedly being unpatentable over United States Patent No. 5,138,971 to Nakajima et al in view of United States Patent No. 3,625,743 to Watanabe. Applicants again traverse this rejection and request reconsideration thereof.

The present invention relates to a device for moistening a material web moved in a transport direction. The device is preferably used for re-moistening of a paper or textile web dried after printing. The device includes a spray device for spraying a water fog onto to the material web under the influence of an electrostatic

field generated by a device for electrostaticly charging. According to the present invention, a reversing roller is provided for reversing the material web upstream of the spray device. The reversing roller has, associated with it, a device for electrostatic charging designed as a corona-charging electrode. The spray device is provided downstream of the reversing roller and has two water spray heads located on both sides of the material web. Applicants have found that using this device, surprisingly, the water particles of the spray mist are sucked by the material web to penetrate the material while the amount of applied water has not led to any formation of surface water on the material web. With this device, an efficiency of more than 95% and sometimes even 98% has been reached. In contrast to known devices, the device also has the advantage that significantly less components are required, thus, reducing the space requirements for the device. This is a particular advantage in terms of being able to retrofit existing pressure systems simply. See, e.g., the paragraph bridging pages 1 and 2 of applicants' specification.

The Examiner admits the Nakajima et al patent does not disclose structure for dispensing on both faces of the web. While the Examiner alleges the Watanabe patent to disclose dispensers which dispense to both faces of the web, it is noted that, in Watanabe, the spray nozzles 40a and 40b are associated with the electrodes/rollers 43a and 43b respectively so that an electric field is generated between the electrodes and the spraying means. In the present invention, on the other hand, the spray device is provided downstream of the reversing roller and its associated corona-charging electrode so that the material web is first charged by the corona-charging electrode and can then be remoistened on both sides by the spray device provided downstream of the reversing roller. That is, according to the present invention, the water fog is sprayed toward the already electrically charged web.

Such is neither disclosed nor suggested by Watanabe or even the combination of Watanabe and Nakajima et al.

More specifically, the patent to Nakajima et al relates to a web charging apparatus for use in a coating system for applying various coating liquids onto a web which has been previously charged by a static field in which conductive wires form a corona discharge electrode. This patent discloses applying coating liquid 10 to a web 6 by a coating die 9. However, the coating die 9 applies the coating liquid 10 to the web 6 only on one side of the web. The coating die is not disclosed to include a spray head and clearly not spray heads located on both sides of the material web.

In fact, the Nakajima et al patent is concerned with only a coating on a single side of the web and, particularly, with reducing thickness variations in the coating. See, column 1, lines 39 - 47; column 1, lines 50 - 56 and column 5, lines 15 - 20 of Nakajima. The Nakajima et al patent is not concerned with moistening the web by spraying a water mist onto the web from both sides.

While the Examiner alleges that it would have been obvious to spray on both sides of the web, it is noted that to do so one could not use the device of Nakajima in which the coating die coats the coating liquid 10 on one side of the web 6 as it passes around a roller. Attempting to coat the other side of the web 6 would not be successful since the coating contacting the surface of the roller opposite coating die 9 would be destroyed.

The patent to Watanabe discloses electrostaticly impregnating sprayed liquid particles onto a moving sheet of paper. However, the Watanabe patent does not disclose the use of a corona-charging electrode for electrostatically charging the paper.

It is submitted that the Nakajima et al and Watanabe patents represent two different fields and that one skilled in the art to which the Watanabe patent pertains would not have looked to the Nakajima apparatus. Watanabe, like the present invention, relates to moistening or impregnating a web, such as a paper web, while the Nakajima et al patent relates to applying a surface coating to the surface of one side of a web. The intended effects, and therefore, the means for providing those effects, are quite different.

It is submitted one of ordinary skill in the art, concerned with reducing thickness variations of a coating liquid on one surface of a web would not have looked to the teachings of the Watanabe patent, since this patent relates to impregnating a web. Conversely, one of ordinary skill in the art concerned with moistening or impregnating a web, as in Watanabe, would not have looked to the teachings of Nakajima et al which relate to providing a coating having a regular thickness on the surface of one side of a web.

As noted in the International Preliminary Examination Report (a copy of which was transmitted to the United States elected office and a copy of which is again attached hereto for the Examiner's convenience):

The publications cited in the search report do not give a person skilled in the art any incentive to construct the charging device in a device according to US-A-3 625 743 (D1) for humidifying a conveyed material web in such a way that a device designed as a corona charging electrode is associated with the return roller for electrostatic charging. This measure results from a step that does not represent a logical development of the prior art cited. The device for humidifying a conveyed material web according to Claim 1 thus involves an inventive step.

While the Examiner alleges that it would have been obvious to replace the coating device of Nakajima et al with the coating devices of Watanabe, it is noted that the coating device of Watanabe requires the electrodes 43a, 43b

to be connected to negative terminals of a high-voltage supply source in order to create an electric field between the electrodes and the spraying means 40a, 40b so as to attract finely atomized water particles onto the moving paper. Even assuming, arguendo, the Examiner is correct that it would have been obvious to replace the coating device of Nakajima et al with that of Watanabe, then it would seem logical to replace the corona discharge electrode of Nakajima et al with the electrodes 43a, 43b since the electrodes are part of the spray system of Watanabe. In doing so, one would not arrive at the presently claimed invention in which a corona-charging electrode is provided associated with the reversing roller. To arrive at the presently claimed invention, the examiner has selectively picked and chosen various elements from the references without any suggestion or teaching to do so in the prior art. This hindsight reconstruction of the invention is not a proper analysis under 35 USC 103.

A preferred embodiment for the location of the electrode is mentioned in claims 7 and 15, and is also shown in the drawing. This way of charging comprises the advantage that, via current 2, the web is charged with an electrical charge and transported on the grounded surface of the roller (3) as long it is in contact with the aforementioned surface. In the moment that and at the place where the web is losing the direct contact of the surface of the roller, a separation of the charge on the surface of the web and the grounded surface of the roller takes place, thereby further charging of the web is generated resulting in a very high charge on the web. Therefore, claims 7 and 15 are novel and not obvious from prior art for these additional reasons.

Watanabe is provided with two (charging) rollers (40a, 40b). In front of one of them there is located another reversing roller (Fig. 1 having no reference numeral being located under reference numeral 42b). This reversing roller is not provided with a corona electrode. Additionally, Watanabe does not comprise spray heads directed against the free running web on opposite sides after having been charged. See claims 17 and 18. So the water fog is not sprayed towards an already electrically charged web as it is the case at the invention but instead towards the rollers (43a, 43b). Since the spray heads are (40a, 40b) are grounded, there is an electric field for the water fog between the spray heads (+) and the rollers (-). Since the charging way of Watanabe allows only an electric field on one of the sides of web, there must be a second charging roller in order to be able to spray a water fog from both sides of the web (like the invention does).

For the foregoing reasons, the presently claimed invention is patentable over the proposed combination of Nakajima et al and Watanabe.

Claims 9 and 16 stand rejected under 35 USC 103 as being unpatentable over Nakajima and Watanabe and further in view of United States Patent No. 3,930,614 to Krenkel. Applicants traverse this rejection and request reconsideration thereof.

The deficiencies of Nakajima et al and Watanabe are noted above.

Now independent claims 9 and 16 require the spray heads to be located opposite one another on different sides of the material web so as to simultaneously spray opposite sides of one portion of the material web at the same time.

While the Examiner cites the Krenkel patent for the embodiment of Figure 2 in which spray nozzles 3 and 3' are located on both sides of a straightly traveling paper web 11, in Krenkel, a uniform electro-static high voltage field is produced over the

entire length of the spray nozzle row by electrodes 4, 4'. According to the present invention, on the other hand, the spray device is provided downstream of the reversing roller and its associated device for electrostatic charging. Such is neither disclosed nor suggested by Krenkel, alone or in combination with Nakajima et al and Watanabe.

Claims 2 - 4 stand rejected under 35 USC 103(a) as being unpatentable over Nakajima et al and Watanabe, and further in view of United States Patent No. 3,863,108 to Blythe et al. Applicants traverse this rejection and request reconsideration thereof.

The Blythe et al patent discloses a method and apparatus for controlling the electrostatic charge density on a surface by generating an ion current adjacent the surface, partially screening the surface from the generated ion current, and controlling the magnitude and sign of the ion current passing to the surface by means of an applied bias voltage. The Examiner has cited this patent as disclosing a chromium plated roller. However, clearly nothing in the Blythe et al patent remedies any of the basic deficiencies noted above with respect to Nakajima et al and Watanabe. Accordingly, claims 2 - 4 are patentable over the proposed combination of references, at least for the reasons noted above.

Claims 5 and 10 stand rejected under 35 USC 103(a) as being unpatentable over Nakajima et al and Watanabe and further in view of United States Patent No. 5,867,760 to Mitsuoka et al. Applicants traverse this rejection and request reconsideration thereof.

The Mitsuoka et al patent has been cited by the Examiner as allegedly teaching a roller having a dielectric layer of polyethylene terephthalate formed on an aluminum sleeve. However, the Mitsuoka et al patent relates to transfer devices

used in, e.g., copying machines, laser printers and facsimiles. This patent discloses that toner attracted onto an electronic latent image formed on the surface of a photosensitive drum is transferred onto a transfer sheet using a transfer bias roller. This patent has absolutely nothing to do with a device for moistening a material web. Accordingly, the Mitsuoka et al patent does not remedy of the basic deficiencies noted above with respect to Nakajima et al and Watanabe. Accordingly, claims 5 and 10 are patentable for at least the reasons noted above.

Claim 14 stands rejected under 35 USC 103(a) as being unpatentable over Nakajima et al and Watanabe and further in view of United States Patent No. 4,826,703 to Kisler. Applicants traverse this rejection and request reconsideration thereof.

The Kisler patent is similar to Watanabe in that a material is sprayed on the surface of a web in the presence of an electric field with charge coating material. However, the Kisler patent does not relate to moistening a web and does not remedy any of the basic deficiencies of Nakajima et al and Watanabe. Therefore, claim 14 is patentable over the proposed combination of references at least for the reasons noted above.

In view of the foregoing amendments and remarks, entry of this amendment and favorable reconsideration and allowance of all of the claims now in the application are requested.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 320.38785X00),
and please credit any excess fees to such deposit account.

Respectfully submitted,

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